

Unit Planning Guide: Grade ____ Unit 7 of 8

Unit Title: Linear, Quadratic and Exponential Models	Pacing (Duration of Unit): 3 weeks
Grade: 9	Buffer Day(s): 00

Desired Results

Transfer Goals

Students will be able to independently use their learning to:

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Established Goals (2011 MA Curriculum Frameworks Standards Incorporating the Common Core State Standards)

Standards (Priority Standards in bold):

- **A-SSE.2 Interpret the structure of expressions. Use the structure of an expression to identify ways to rewrite it. For example, see $x - y$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.**
- F-IF.7a Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
- F-IF.7b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
- F-IF.7c Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
- F-LE.1 Distinguish between situations that can be modeled with linear functions and with exponential functions.
- F-LE.1a Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
- F-LE.1b Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
- F-LE.1c Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
- **F-LE.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).**
- F-LE.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly,

WiDA Standards (ELL)

Standard 1: ELLs **communicate** for **Social and Instructional** purposes within the school setting
Standard 3: ELLs **communicate** information, ideas and concepts necessary for academic success in the content area of **Mathematics**

In the lesson planning stage, teachers will need to differentiate lessons for ELLs. In order to accomplish this they will need: 1.) this curriculum map, 2.)

<p>quadratic ally, or (more generally) as a polynomial function.</p> <ul style="list-style-type: none"> F.LE.5 Interpret expressions for functions in terms of the situation they model. Interpret the parameters in a linear or exponential function in terms of a context. A-REI.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. <i>For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.</i> F-IF.8a Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. F-IF.MA.8c Translate among different representations of functions and relations: graphs, equations, point sets, and tables. 	<p>a list of their ELLs and their proficiency levels, and 3.) appropriate language function expectations and scaffolds or supports.</p> <p>To be completed in collaboration with the ELL Department</p>
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Meaning (*Mostly assessed through Performance Tasks/Assessments)

<p>Big Ideas: (Statements and concepts written in teacher friendly language which reflect the important [but not obvious] generalizations we want students to be able to arrive at. These are used by the teacher to focus daily instruction.)</p> <ul style="list-style-type: none"> Analyze linear, quadratic, and exponential functions to determine unique qualities between the three types of functions. Find the intersection between a linear and exponential function and between a linear and quadratic function. 	<p>Essential Questions: (Questions which frame ongoing and important inquiries about the big ideas. They are written for students and used in daily instruction to help engage students in meaningful thinking.)</p> <p>- What is unique about an exponential function as compared to a linear or quadratic function?</p>
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Acquisition (*Mostly assessed through traditional summative assessments)

Knowledge: Key basic concepts, facts, and key terms (written in phrases) students should be able to recall independently.

Students will know ...

- Constant first differences linear
- Constant second differences quadratic
- Multiplicative first difference exponential
- Find intersection of two functions graphically and algebraically

Skills: The discrete skills and process students should be able to use independently (Bloom's Level of Learning should be noted in parentheses.)

Students will be skilled at:

- Differentiating between constant and non constant rates of change
- Finding points of interception between two functions by solving a simultaneous system